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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Osamu Shimamura et al.
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Examiner/Art Unit:	A. Arciero/1795
Title:	LITHIUM-ION BATTERY AND METHOD FOR ITS MANUFACTURE

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Commissioner for Patents
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Pursuant to the Pre-Appeal Review procedures promulgated 12 July 2005, Applicants hereby submit this Pre-Appeal Brief Request for Review.

In the Office Action dated November 5, 2009 and marked final, the Examiner rejected claims 1, 3-16 and 20-27 under 35 U.S.C. § 103(a). Applicants respectfully submit that the Office Action improperly issued as a final Office Action because the Examiner has omitted one or more essential elements needed to support rejections under 35 U.S.C. §103(a). Moreover, this omission results, at least in part, from an incorrect legal interpretation that results in the Examiner omitting findings of fact required to support a *prima facie* rejection. Accordingly, the record is insufficient to support a final rejection.

Applicants' claim 1 recites a lithium ion battery comprising a cathode, an anode and an electrolyte layer between the cathode and the anode, wherein the cathode, the anode, and the electrolyte layer constitute a cell element. The electrolyte layer consists essentially of a pattern of individual insulating particles with a plurality of interstitial spaces therebetween, with electrolytes occupying at least some of the interstitial spaces, wherein each individual insulating particle in the pattern is selectively arranged directly on one of the cathode and anode, the individual insulating particles arranged such that the cathode and the anode do not contact each other.

The Examiner contends that Hisamitsu et al. (US 2004/0126655) discloses all of the elements of claim 1 except for the claimed electrolyte layer. (Office Action, p. 2). However, the Examiner states that Hisamitsu et al. teaches using an ink-jet method to form all the layers of the battery including the electrolyte layer. (Id.) Since Delnick (US 5,865,860) teaches an electrolyte layer comprising a porous separator structure comprising individual insulting particles of silica or alumina and a polymer binder (citing col. 5, ll. 36-57), wherein electrolytes are applied via ink-jet printing to uniformly occupy the interstitial spaces of the porous separator structure (citing Abstract), the Examiner states that the combination teaches the invention. (Office Action, pp. 2-3). Moreover, the Examiner takes the position that the electrolyte layer of Delnick produced by Hisamitsu et al. would inherently "consist essentially of" a pattern of insulating particles comprising a plurality of interstitial spaces therebetween such that electrolytes occupy a majority of the interstitial spaces.

The Examiner's rejection ignores certain language of the claim. First, claim 1 requires that the electrolyte layer consists essentially of a pattern of individual insulating particles and that each individual insulating particle in the pattern be selectively arranged directly on one of the cathode and anode and arranged such that the cathode and the anode do not contact each other.

Delnick describes a separator layer 208 made of a suitable mixture of a solid particulate, such as alumina or silica, and a polymer binder. (Col. 5, ll. 44-47). Because it is a mixture, it is impossible for the individual particles therein to be patterned as claimed. That is, the solid particulate is mixed in the polymer binder such that the separator layer 208 is formed. No pattern of the solid particulate is formed. Moreover, as illustrated schematically in FIG. 4 of Delnick, the solid particulate is mixed throughout the polymer binder in the separator layer 208, not in contact directly with the interface 209 with active electrode layer 206. Accordingly, no pattern is formed by particles directly on one of a cathode or anode. This would be contrary to the teaching in Delnick that the porous structure of the separator layer 208, when present, continuously extends into the first layer 206 through the interface 209. (Col. 5, ll. 29-35).

Applicants further submit that the Examiner's rejection does not properly address the meaning of the phrase "consisting essentially of" with respect to the claimed electrolyte layer. As mentioned above, the separator layer 208 of Delnick, when present, comprises a mixture of a solid particulate, such as alumina or silica, and a polymer binder.

(Col. 5, ll. 44-47). The transitional phrase "consisting essentially of" limits the scope of a claim (or claim element) to the specified materials or steps "and those that do not materially affect the basic and novel characteristic(s)" of the claimed invention or element. *In re Herz*, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976) (emphasis in original). Applicants submit that the Examiner has completely failed to make any findings of fact to support or even to state or express why the inclusion of a binder material in the mixed layer would not materially affect the basic and novel characteristics of the claimed electrolyte layer.

Applicants expressed this disagreement with the Examiner in the Reply to the final Office Action submitted December 14, 2009, stating that the Examiner was ignoring the inclusion of the binder in the Delnick separator. However, in an Advisory Action dated January 11, 2010, the Examiner indicates that "consisting essentially of" is interpreted as not excluding other elements, such as the binder of Delnick, since the structure of the separator material is further limited in other dependent claims. Applicants submit that this statement is incorrect as a matter of fact and of law. First, those of the dependent claims referring to the electrolyte layer do not add any new components to that layer—they merely further modify existing features of the electrolyte layer of claim 1. Second, "consisting essentially of" does not necessarily exclude other elements from the electrolyte layer, but it requires exclusion of those elements that materially affect the basic and novel characteristics of the electrolyte layer. Here, the patterned arrangement of insulating particles provides a high-strength gap that separates the electrodes to prevent short-circuiting while holding the electrolytes even in the event of pressure on the battery from an external load and in the absence of an insulating seal layer around its periphery. (Applicants' ¶ [0044]). Nothing in Delnick teaches or suggests that the optional porous separator layer 208, which includes the binder, provides these basic and novel characteristics, and the Examiner does not address this issue.

Relatedly, and with regard to the Examiner's inherency position, Applicants submit that even if the separator layer 208 were applied with an ink-jet, which is not described in Delnick, the electrolyte layer of Delnick produced by Hisamitsu et al. would not inherently "consist essentially of" a pattern of insulating particles comprising a plurality of interstitial spaces therebetween such that electrolytes occupy a majority of the interstitial spaces. The application would involve application of the binding layer mixed with the particles. As a result, and for the reasons described above, the Examiner has not met his burden of proof of "provid[ing] a basis in fact and/or technical reasoning to reasonably

support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy,* 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).

Applicants respectfully submit that, for each of the foregoing reasons, the final rejection of claim 1 and its dependent claims is improper because the record is insufficient to support a final rejection.

Applicants' independent method claim 10 recites in part applying individual insulating particles directly to at least one of a cathode and an anode and applying an electrolytic polymer to at least some of a plurality of interstitial spaces between the individually applied insulating particles to form an electrolyte layer. However, no combination of Hisamitsu et al. and Delnick teaches at least the step of applying individual insulating particles directly to at least one of a cathode and an anode. The Examiner does not acknowledge that separator layer 208 of Delnick is applied as a layer rather than as individual particles and does not address the fact that, even if it were applied by an ink-jet, for example, separator layer 208 would still not apply individual insulating particles directly due to the presence of the solid particulates in a mixture with the polymer binder. That is, the presence of the binder in Delnick would prevent application directly to at least one of a cathode and an anode, regardless of the teachings of Hisamitsu et al. Accordingly, the rejection of claim 10 and its dependent claims under 35 USC §103(a) is also improper.

Applicants' independent claims 15 and 16 recite in part a battery assembly comprising multiple connected batteries, wherein each of the connected batteries comprises an electrolyte layer consisting essentially of individual insulating particles individually applied directly to at least one of the cathode and the anode and affixed thereto, and electrolytes occupying at least some of a plurality of interstitial spaces between the individual insulating particles. The deficiencies with respect to the combination of Hisamitsu et al. and Delnick as noted above exist here. Moreover, the Examiner's inclusion of Triplett (US 3,566,985) does not cure the deficiencies in that combination because Triplett is cited only for an electric vehicle driven by an electric motor powered by a DC battery having a plurality of cells. It does not teach or suggest the claimed electrolyte layer. Accordingly, the rejection of claims 15 and 16 and their dependent claims under 35 USC §103(a) is also improper.

Applicants accordingly request Review because the Office Action dated December 5, 2009 was improperly issued as a final Office Action. The Examiner omitted one or more essential elements needed to support rejections under 35 U.S.C. § 103.

Very truly yours,

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